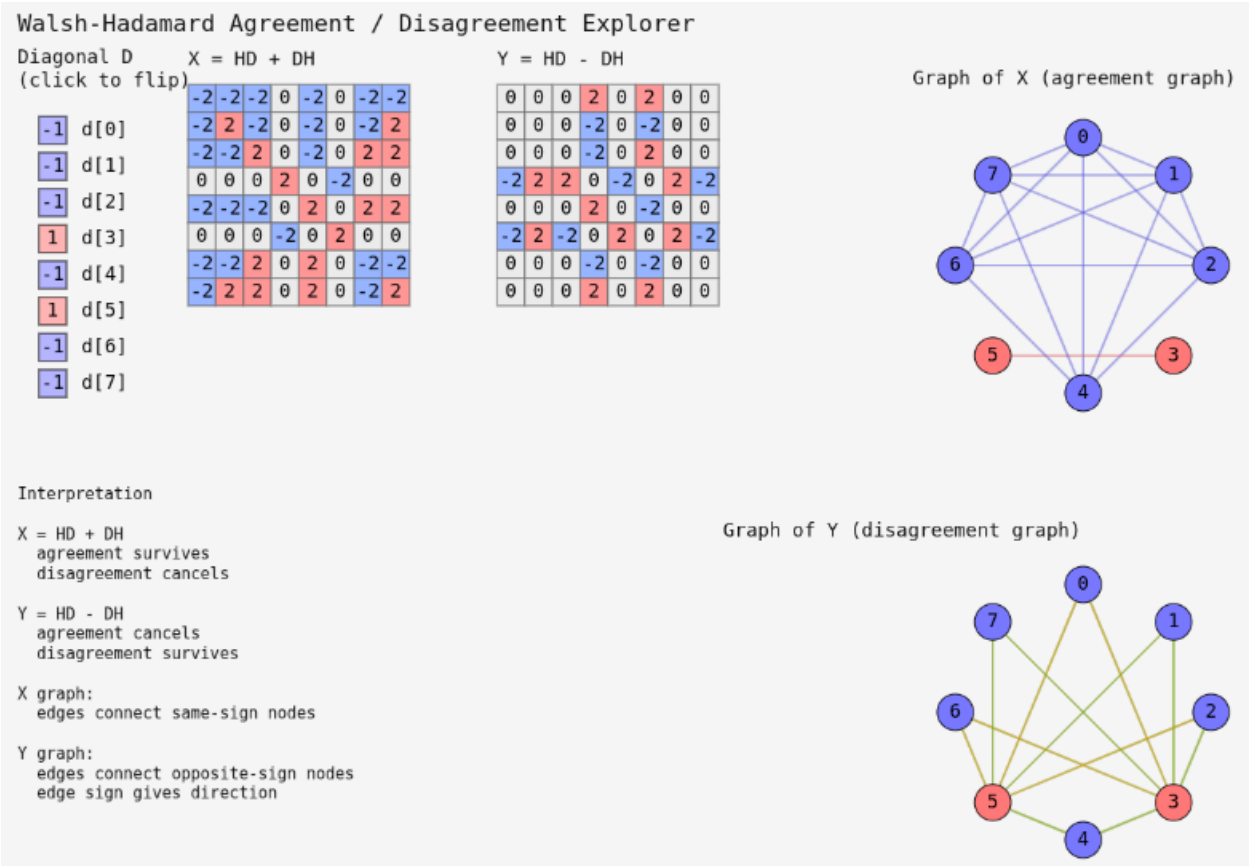

This interactive sketch explores how a binary diagonal matrix D interacts with the Walsh–Hadamard mixing matrix H. Each entry of D can be flipped between +1 and -1, dividing the nodes into two groups.

The code visualizes two derived operators:

- X = HD + DH
- Y = HD - DH

These have a surprisingly clean interpretation:

- **X** keeps interactions between nodes with the **same sign** (“agreement”).
- **Y** keeps interactions between nodes with **opposite signs** (“disagreement”).

Because the Walsh–Hadamard matrix contains only ±1 entries, the resulting matrix values become simple:

- reinforcement: +2
- cancellation: 0
- opposite reinforcement: -2

The graph views make this intuitive:

- The graph of X splits into same-sign clusters.
- The graph of Y becomes a bipartite interaction graph between opposite-sign groups.

As entries of D are flipped, the system transitions between:

- uniform structure (all signs equal),
- clustered structure,
- and maximal cross-group interaction when the signs are balanced.

View Online

Code